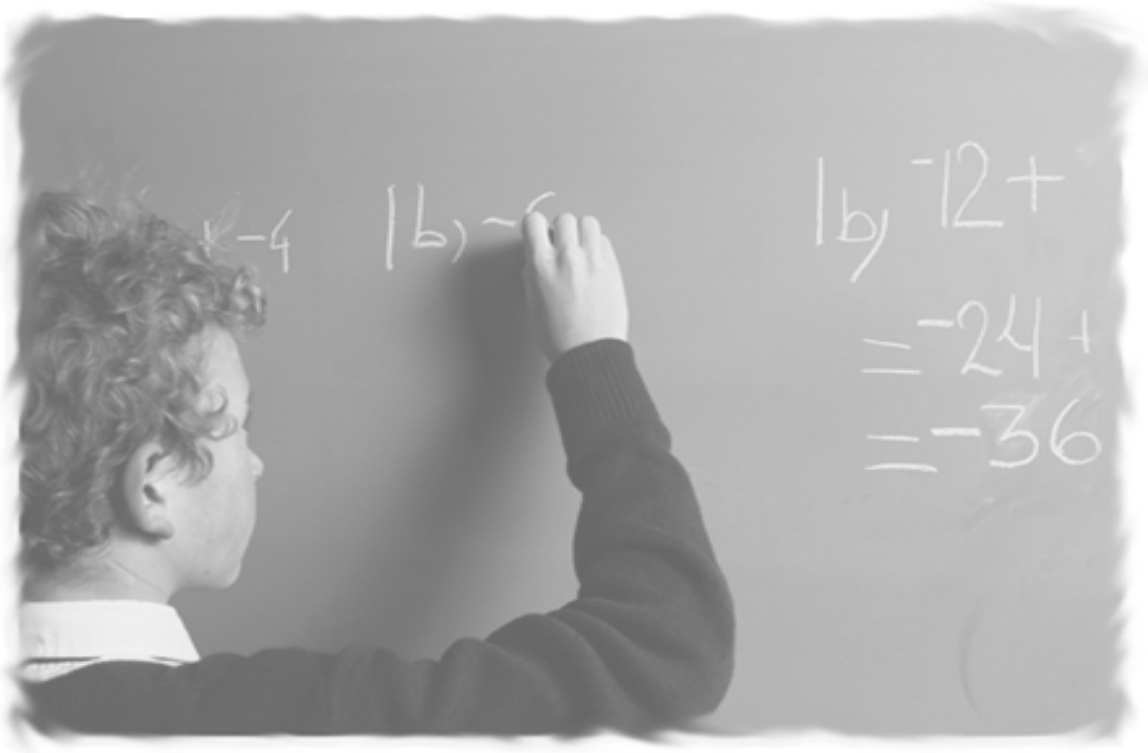
Math Teachers Count:

Raising Teacher Knowledge and Skills = Raising Student Achievement



Report with Recommendations to: The Governor, Superintendent of Public Instruction, State Board of Education, and Education and Fiscal Committees of the Washington State Legislature

PROFESSIONAL EDUCATOR STANDARDS BOARD

November, 2004

PESB Vision/Mission

Vision/Mission

The vision of the Washington Professional Educator Standards Board (PESB) is educator quality, recognizing that the highest possible standards for all educators are essential to ensuring attainment of high standards for all students. The mission of the PESB is to:

- Advise and provide recommendations to the State Board of Education, Superintendent of Public Instruction, Governor and Legislature on the full range of issues affecting certified education professionals, including: recruitment, hiring, preparation, certification, mentoring, professional growth, retention, governance, assessment, and evaluation;
- Oversee effectiveness of new basic skills and subject matter assessments to be required of all new teachers prior to state certification; and
- Bring greater public focus and attention to policy issues affecting certified education professionals.

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Background and Introduction

The supplemental budget enacted by the Legislature and signed by the Governor in April 2004 charged the Professional Educator Standards Board (PESB) with submitting a report by November 1, 2004, to the Governor, Superintendent of Public Instruction, State Board of Education, and the education and fiscal committees of the Legislature regarding:

> *. . . . specific implementation strategies to strengthen mathematics initiatives by improving teacher knowledge and skill development including: (i)teacher preparation program approval standard changes; (ii) teacher certification requirement changes and the development of new expertise credentials; (iii) state-established standards to guide the approval of professional development providers and offerings related to mathematics; and, (iv) other related recommendations. The PESB shall base the recommendations on determinations of the status of teacher preparation and professional development opportunities and work with appropriate parties.*

Over the course of seven months, the PESB:

- Formed a subcommittee of members, using outside expertise as needed, to review research and exemplary state practices related to preparation and ongoing professional growth for teachers providing instruction in mathematics;
- Assessed current status of preparation and professional development in Washington State;
- Invited presentations and convened panel discussions with practitioners and experts in conjunction with PESB meetings; and
- Collaborated with other agencies, organizations and individuals working to improve mathematics instruction in Washington State on developing recommendations related to this charge.

The PESB appreciates that in giving us this charge, the Governor and Legislature recognize the crucial role of teacher knowledge and skills in student math achievement. What teachers know and how they deliver instruction to students are by far the greatest determinates of what students learn and which students learn it. Thus, the preparation and ongoing professional development provided to math teachers are of critical importance. At the same time, the PESB approached this study mindful of the fact that mathematics doesn't exist in a curricular vacuum. For example, student achievement in mathematics relies heavily on the ability to read and write. So where our recommendations are applicable beyond math, we have generalized appropriately. In addition, recent research has revealed much about cognitive development in children and how learning takes place. The arts, physical education, and scientific inquiry, are all essential to facilitating cognitive development and to children reaching stages that enable them to acquire mathematical concepts and skills. This is critical to good teaching of mathematics and for understanding why certain teaching strategies work and others do not.

As a board composed of primarily practicing educators, the PESB is keenly aware of the many efforts underway in Washington to ensure students receive the mathematics instruction they need to reach state standards. The state, districts and schools have focused time and resources on this, and student test scores are on the rise as a result. The percentage of fourth-graders performing at

or above standard has risen from 21.3% in 1997 to 59.9% in 2004. Seventh graders at or above standard has risen from 20.1% in 1998 to 46.3% in 2004, and 43.9% of tenth-graders were at or above standard in 2004, compared to 33% in 1999. In addition to the fourth, seventh and tenth-grade Essential Academic Learning Requirements in Mathematics, Washington now has well-articulated Grade-Level Expectations for K-10. The Legislature has invested in targeted assistance for schools struggling with math achievement through the Math Helping Corps, and as a result these schools have experienced significant gains. Prospective teachers in Washington are held to higher academic standards than ever, with new performance-based standards for beginning and experienced teachers and a required subject knowledge assessment for certification.

There are many more examples of ways in which Washington is making strides to improve instruction and student learning in mathematics. **Our study and recommendations focus on policy supports we believe necessary for continued progress and improvement.**

For purposes of our study and this report, we divided the discussion of the issues and findings into two major areas of focus:

1. Teacher preparation program approval standard changes / certification requirement changes; including development of new expertise credentials.
2. State-established standards to guide the approval of professional development providers and offerings related to mathematics.

Following our discussion of PESB findings with regard to the status of these issues in Washington State are specific recommendations for changes in state policy and practice.

TABLE OF CONTENTS

PESB Vision/Mission 1

Background and Introduction 3

Teacher Preparation Program Approval Standard Changes/ Certification Requirement Changes, Including Development of New Expertise Credentials 7

Status in Washington 7

Becoming a Math Teacher in Washington State: Certification Requirements for Teachers 7

Who Actually Teaches Math? 8

Preparing Math Teachers in Washington State: Program Approval Standards 9

Washington's Movement Toward a Competency-Based System 11

Development of New Expertise Credentials 12

State-Established Standards to Guide the Approval of Professional Development Providers and Offerings Related to Mathematics 15

Status in Washington 15

State Approval of Inservice Providers 15

Research-Based Effective Inservice Professional Development 17

New Standards to Guide Provision of Professional Development for Continued Licensure 19

Implications for Changes in the State Role / System of Approving Providers of Inservice Professional Development for Certificate Renewal 20

Recommendations for State Policy Makers 21

Summary of Recommendations 30

Appendix A 33

List of Certificate Endorsements 33

Appendix B 37

Course Requirements for K-8, Middle Level Math / Science and Math Endorsements 37

Appendix C 49

Sample Standards-Based Approved Providers / Applications From Other States 47

Teacher Preparation Program Approval Standard Changes/ Certification Requirement Changes, Including Development of New Expertise Credentials

Status in Washington State

Mirroring K-12 education reform, since 2000 Washington's system of teacher preparation and certification has been transitioning to a performance-based system requiring demonstration of competency against uniform state standards as opposed to a system based on course and credit requirements.

Table 1

	Pre-1987	1987 – 2000	Current
First-Tier Certificate	Provisional Certificate Completion of uniform sequence of course requirements leading to certificate. No endorsements; could be assigned to teach any subject	Initial Certificate Completion of uniform sequence of course requirements leading to certificate and subject endorsement(s)	Residency Certificate (effective 2000) Attained by performance-based demonstration of state-defined knowledge and skill standards, including positive impact on student learning
Second-Tier Certificate	Standard or Unendorsed Continuing Certificate – issued when renewing provisional certificate	Continuing Certificate Any master's degree or 45 post-baccalaureate credits	Professional Certificate (effective 2001) Completion based on demonstrated competency against uniform standards.

Becoming a Math Teacher in Washington State: Certification Requirements for Teachers

Under the current system, prospective teachers in Washington State are required to:

- Possess a baccalaureate degree;
- Complete one of 21 approved higher education teacher preparation programs; or one of six new alternative route partnership programs in Washington State. Regardless of program, all candidates must meet common state standards; and
- Pass a test of basic skills (WEST-B) in reading, writing, and mathematics for admission into a teacher preparation program or alternative route program and, beginning in September 2005, a test of the subject knowledge they will teach (WEST-E / Praxis II) prior to certification.

As part of their preparation program, prospective teachers earn subject matter "endorsements" on their teaching certificates. Washington has 33 sets of "endorsement competencies" – one for each endorsement. Appendix A contains the full list of teaching certificate endorsements. Prospective teachers must demonstrate they meet the knowledge and skill competencies for each endorsement they earn. Currently certified teachers can add endorsements to their teaching certificate. Depending on how similar the endorsement being added is to the endorsement they currently hold, teachers can add endorsements through passage of the Praxis II subject knowledge test alone, or through a higher education teacher preparation program. Endorsements may also be added by achieving National Board certification.

There are three endorsements that are specific to the knowledge and skills of a teacher prepared to provide math instruction:

1. K-8 (elementary)
2. Middle Level Math and Science (MLMS)
3. Math (secondary 9-12) (Math)

In order to meet the endorsement competencies, the required baccalaureate degree must be in a related subject area. Although Washington does not collect data on type of degree by endorsement, typically a teacher with a math endorsement possesses a math or math-related degree (e.g. engineering), or can demonstrate through analysis of college transcripts or, beginning in 2005, passage of the state's subject knowledge test for teachers, that he/she meets the endorsement competencies. Teachers with an endorsement in MLMS typically complete a minor that includes courses in math and science in addition to majoring in elementary education, math, or a science. Many teachers with K-8 endorsements complete undergraduate programs that result in a bachelor's degree in elementary education. Appendix B shows the current course requirements for these endorsements at each institution where the endorsement is offered. It is important to note, however, that when the new endorsement competencies were implemented, they replaced previous course and credit requirements. Under this approach, teacher preparation programs certify that prospective teachers produce sufficient evidence of having met standards; rather than just completing seat-time requirements. This enables them to also take into consideration prior coursework and experience.

Who Actually Teaches Math?

While the above information describes requirements for new teachers endorsed in math, middle-level math and science and K-8, it does not describe the qualifications of all teachers who provide math instruction.

- **Teachers certified under past systems -**

While endorsement requirements and competencies that are part of current certification requirements are intended to ensure that teachers have adequate knowledge and skills in the subjects they are endorsed to teach, as shown in Table 1, previous systems of certification prior to 1987 did not require subject matter endorsements. Approximately 17% of Washington teachers still possess unendorsed certificates. In addition, Washington does not collect data on the type of baccalaureate degree held by teachers with either endorsed or unendorsed certificates, so we don't know how many teachers providing math instruction actually majored or minored in math or had significant math coursework.

- **Related issue of assignment policy -**

Even under the current requirements for certification, State Board WAC provides districts a fair degree of latitude in assignment of teachers. This is essential in a state with large numbers of rural and remote communities with significant difficulties in recruiting and retaining teachers for certain subjects, such as math. There are widely varying opinions about the scope of out-of-field assignment in Washington[1], but the bottom line is, we don't really know. Washington does not collect teacher assignment data related to endorsement or degree. Districts can grant waivers themselves, and are only required to request waivers of the State Board of Education for the most unrelated and longer-term out-of-endorsement assignments. Concerns about district under-reporting exist. For those districts reporting waivers, numbers have increased from 194 in the 00-01 school year to 437 in the 02-03 school year[2]. Nationally, about one in three high school math students is taught by a teacher who lacks a major in either mathematics, math education or a related field (e.g. engineering). Middle school level fairs even worse nationally, where 61% of our students are taught mathematics by teachers who lack even a minor in math.[3] According to the Third International Math and Science Study, 41% of teachers teaching 8th grade math in the United States have either a major or minor in math compared to 71% of middle-level math teachers in other countries.[4]

Waiver requests for teachers to be assigned to teach out of their endorsed subject area have increased from 194 in 2000-01 to 437 in 2002-

To assist districts with compliance with state policy and the federal No Child Left Behind Act, the State Board of Education approved an "endorsement-related assignment" policy which specifies courses that may be appropriate assignments for certain endorsements. For example, teachers with a science endorsement may appropriately teach most secondary math courses, such as general mathematics, pre-algebra, algebra, pre-calculus and calculus. Therefore, these teachers are no longer considered assigned "out-of-endorsement" for purposes of state or federal compliance. However, some educators and policymakers have voiced concern that these teachers are still assigned out-of-field and are not as well qualified to teach mathematics. For example, while according to the State Board's assignment chart teachers endorsed in general science, biology, chemistry, physics or earth science may be assigned to teach math, there are no other appropriate assignments for teachers endorsed in math other than math. Rural and remote districts, already having difficulty finding math and science teachers, will have a strong incentive to hire science teachers to teach both math and science, rather than recruit/hire a teacher endorsed in math or encourage a science teacher to add a math endorsement.

Preparing Math Teachers in Washington State: Program Approval Standards

Washington State has 21 higher education institutions approved by the State Board of Education to prepare teachers for state certification. All offer the K-8 endorsement, seventeen of them offer a math endorsement, and eight currently offer a middle-level math and science endorsement. In addition, there are six alternative route partnership programs that operate as partnerships between school districts and higher education institutions. Five alternative route programs offer a math endorsement and three offer middle-level math and science.

Programs are initially approved and periodically reviewed against five "performance-based preparation program approval standards" established in State Board WAC. Two of these speak

directly to ensuring teachers acquire necessary knowledge and skills in the subjects they will teach and programs evaluating their success in doing so.

> STANDARD II: ACCOUNTABILITY
> The unit *[colleges of arts, humanities, sciences, and education]* has a system that collects and analyzes data on applicant qualifications, candidate and graduate performance, and unit operations to evaluate and improve the unit and its programs.
>
> STANDARD V: KNOWLEDGE AND SKILLS
> Candidates preparing to work in schools as teachers or other professional school personnel know and demonstrate the content, pedagogical, and professional knowledge, skills, and dispositions necessary to help all students learn. Assessments indicate that candidates meet professional, state, and institutional standards.

There are additional accountability measures for preparation program quality established in State Board WAC: Professional Education Advisory Boards, program review and site visits, and a survey of program completers. Each preparation program must establish a Professional Education Advisory Board (PEAB) composed of teachers, administrators and college or university representatives. Each teacher preparation program PEAB submits an annual report to OSPI with program enrollment and completion data, a survey of PEAB activities, and general recommendations for program improvements. The PEABs are also asked to report how teacher candidates at their program "acquire and demonstrate knowledge and skills related to the prevention and diagnosis of reading difficulties and research-based intervention strategies", but no similar information for math or other content areas is required. Although higher education teacher preparation programs are required to produce a significant amount of data related to various aspects of program quality, those data are not systematically compiled in a way that provides a comprehensive picture that can be easily accessed and reviewed by the public.

"Teacher preparation programs are required to produce data related to various aspects of program quality, but those data are not systematically compiled in a way that provides a comprehensive picture that can be easily accessed and reviewed by the public"

Prior to renewing each program's five-year approval, the State Board of Education also conducts an on-site review of evidence that the program is meeting the five program approval standards. The site visit team is composed of staff from OSPI's professional education and certification division, a representative from the State Board of Education, a representative from the Professional Educator Standards Board, and a representative from a peer higher education preparation program. Although, as previously mentioned, program approval Standard 5 deals with prospective teacher knowledge and skills, the program review process and site visits do not incorporate external expertise in specific content areas, nor do individuals with subject knowledge expertise review evidence related to endorsement programs and competencies. For example, although institutions offering a math endorsement have to provide detailed documentation of student work as evidence of competency in math instruction, this evidence is not necessarily reviewed by anyone with expertise in mathematics education.

Washington's Movement Toward a Competency-Based System

Over the course of the PESB study, we heard concerns and doubt voiced from K-12 educators, curriculum experts, and representatives from higher education teacher preparation as to whether Washington's K-8, MLMS, and Math endorsement competencies reflect the critical math content and content-specific instructional methodology that teachers providing math instruction should possess. A panel of representatives from Washington Teachers of Teachers of Mathematics (WAToToM), staff with the Washington Math Helping Corps, Washington State Mathematics Council, and other math educators shared with the PESB their belief in the importance of ensuring that preservice teachers have adequate math content knowledge and their concern that math instruction for prospective teachers, and in turn the instruction provided K-12 students by those teachers, still focuses too much on rote memorization and mathematical formulas and procedures, and not enough on understanding mathematical concepts and theories. Others, including the PESB, are concerned that for middle level educators in particular, the emphasis of the endorsement competencies are too heavily weighted on child development and not enough on math content knowledge. Research supports a strong relationship between course preparation in math content *and* teaching methods and student achievement[5]. However, it is not clear if there is consensus about exactly what type and depth of math are appropriate. There are conceptual differences regarding the most important type of math knowledge teachers should possess and a national debate occurring akin to the past "phonics versus whole-language" debate about reading. However, in Washington, the emphasis of our state Essential Academic Learning Requirements (EALRs) and Grade Level Expectations (GLEs) can and should play a significant role in settling that debate and drive the math content for prospective teachers to best align with student standards.

A debate also exists as to the depth of content knowledge needed by prospective math teachers beyond the depth of content of their students. Some research suggests that too much math knowledge, at the expense of less emphasis on instructional methodology, is actually counterproductive in that the more advanced the mathematics course, the wider the gap between the mathematics the teacher studies and the math they will be teaching.[6] On the other hand, WAToToM and others agree that the level of math content experienced by prospective elementary teachers is often too little. This view is supported by the National Conference Board on Mathematical Sciences, whose recent report stated, "there is evidence of a vicious cycle in which too many prospective teachers enter college with insufficient understanding of school mathematics and have little college instruction focused on the mathematics they will teach"[7] Studies document that elementary educators in particular, tend toward fear and avoidance of math content and pedagogy, and without it, they develop instructional techniques that mimic the way they themselves were taught math.[8]

Beyond the question of the knowledge and skill competencies for math teachers is the issue of how their attainment is assessed. The PESB has responsibility for the subject knowledge test for all endorsements, including K-8, MLMS and math. Despite completion of validity studies, some educators are concerned as to whether these tests align well with, and are thereby a valid assessment of, Washington's current endorsement competencies. Potential changes in the competencies will require even further analysis in terms of alignment and validity.

The move toward a competency-based system is a tremendous effort and challenge for higher education preparation programs and requires significant collaboration with colleges of liberal arts and sciences. The strength of the national movement toward competency-based preparation, and Washington's own endorsement competencies, is that they require evidence of attainment of specific knowledge and skills. At the same time, national reports and individuals with expertise in math here in Washington call for "more coursework" or "a year of math"[9]. This illustrates the "bilingual" nature of the conversation between higher education institutions, particularly their math department faculty, who view adequate math content knowledge in terms of courses, and those at the state level seeking a uniform way to define adequate math content by defining the desired knowledge and skill standards. "Coursework is currency in higher ed" commented one math professor. Critics of teacher preparation tend to overlook or may be unaware of the fact that prospective teachers take most of their subject knowledge coursework through colleges of liberal arts and science; not through colleges of education. However, it is the colleges of education that verify that all requirements, in terms of knowledge and skills, have been met. Under this scenario, it becomes unclear as to what degree the new endorsement competencies are relevant and actually driving math curriculum experienced by prospective teachers. "We map the competencies onto our existing courses" is how one math faculty member described the process. Complicating matters for higher education is how much is expected of prospective teachers in a short period of time. The list of endorsement competencies is long, especially for elementary educators. It may be that in addition to considerations of what to add, there needs to be consideration of what to remove; consideration as to what are the most essential competencies for beginning teachers to attain.

Critics of teacher preparation tend to overlook the fact that prospective teachers gain their subject knowledge coursework through colleges of liberal arts and science, not through colleges of education. Preparing teachers necessarily involves the entire

Development of New Expertise Credentials

Progress to date and continued improvements in Washington's system of preparing and certifying math educators will help ensure that teachers providing instruction in math are highly qualified. However well-prepared a new teacher may be, it is unrealistic to expect that a math teacher will possess all of the content and instructional skills he/she will need for varying curriculum and to work in varying school settings without additional guidance and support. Several national reports and research articles on improving math instruction suggest that developing a corps of individuals with math instructional expertise to coach and identify needed professional development for other math teachers is an effective strategy, with two reports calling for specialists available in every school building.[10] While this may be a fiscal challenge for states, research suggests that, whenever possible, development of local expertise, as opposed to external intervention, may be more readily accepted and ultimately more timely and effective in assisting teachers.[11] Evaluation of Washington's Math Helping Corps, widely viewed and evaluated as a successful program, reflects this:

> *Teacher buy-in and acceptance of a content area "coach" is central to the success of the coach and subsequently central to the success of the teachers and students. One of the important factors to emerge in the evaluation is the importance of the coach being a respected, skilled educator in their own right and an effective facilitator. In many ways districts will be at an advantage using skilled teachers from within the district to provide support. Grantees and coordinators in both Cohort 1 and Cohort 2 spent a long time getting to know each other and learning how to work together. One would assume that an employee from within a district would be able to short cut this initiation time.*[12]

However, many schools and districts struggling to even find qualified math teachers lack the capacity to develop this model of support and assistance from within. Some will need state- or regionally-provided assistance. For these reasons, no one model of assistance is appropriate for the variety of districts and schools in Washington State.

In terms of ways by which teachers gain expertise to serve in a coach or specialist role, other states have accomplished this through either state- or locally- provided training, or by requiring or making available a formal credential through the state's certification system. Virginia is an example of a state that has created a new math specialist credential for elementary and middle schools as part of their certification system. In its report to the Virginia Legislature, the Mathematics Specialist Task Force proposed that support of math specialists in schools would be key to sustaining the impact of math initiatives and professional development and "making them stick". The Virginia Task Force recommended establishment of a math specialist certificate endorsement and uniform standards for preparation and certification. Most states have a reading specialist credential and many states, including California, Arizona and Maryland, have created a math specialist credential either as a separate certificate or endorsement to an existing teaching certificate. On the other hand, many school districts across the country and in Washington State have created math specialist/coach/mentor positions that are not tied to a state-issued credential. An advantage of preparing and certifying math specialists as part of a state's certification system is that it provides professional recognition and assurance of consistency in training and competencies statewide. The potential disadvantage is greater cost, less access, and less ability for districts to influence training of specialists to meet their unique needs. But these options are not mutually exclusive. Yet another option exists wherein states provide guidelines for districts related to the eligibility, training, and role of math specialists, combined with funding for districts that comply with state guidelines. Washington's 2004 supplemental budget mirrors this option, providing funding for OSPI to "*work with mentor teachers from around the state to develop guidelines for eligibility training, and professional development for, mentor math teachers*". Development of these guidelines is expected to be completed by June 2005.

State-Established Standards to Guide the Approval of Professional Development Providers and Offerings Related to Mathematics

Status in Washington

Teachers participate in professional development that yields continuing education credits ["clock hours" or higher education credits] for primarily two purposes: 1) to advance on the salary schedule; and 2) to meet continuing education requirements for maintaining their certificate. While about 17% of teachers in Washington still hold a pre-1987 certificate that does not require continuing education for maintenance of their certificate, most teachers are required to maintain their certificate with 150 continuing education credit hours. As the first group of teachers seeks renewal of their professional certificate in 2005, they will have the added requirement of selecting clock hours that align with professional certificate knowledge and skill standards or with salary-related criteria, such as their school's improvement plan, or their current or anticipated assignment. Whether pursuing inservice to advance on the salary schedule, to meet continuing education requirements or both, inservice credits must be obtained from a state-approved provider of inservice credits.

State Approval of Inservice Providers

Who can award continuing education credits?

- School Districts
- Educational Service Districts (ESDs)
- Approved Private Schools
- State Agencies
- Colleges / Universities
- Professional Organizations (nonprofit with board of directors)

How do these entities become approved providers?

- Submit an annual "assurance of compliance" form to OSPI declaring that they are in compliance with standards for inservice providers;
- Maintain required records for 7 years related to each inservice program offering, for inspection by OSPI should complaints warrant; and
- Prior approval of the board, commission, or committee governing the inservice provider, based on whether they've met inservice provider standards.

What are state standards for inservice providers?

State Board WAC 180-85-200 specifies the following as standards for providers of continuing education credits:

- Written objectives for each program offered;
- Agenda that clearly delineates topics, date, time, and names and qualification of instructors;
- Instructors with appropriate expertise;
- Program materials available to all participants;
- Evaluations compiled and kept for 7 years;

- Regular analysis and report of success of programs offered to the governing body of the provider;
- OSPI staff must be permitted to attend any inservice; and
- Forms for claiming clock hours must be provided.

State Board WAC also specifies that approved inservice providers are required to solicit participant evaluation of each program, including their evaluation of:

- Extent to which program matched written objectives;
- Quality of physical facilities;
- Quality of oral presentation;
- Quality of materials provided; and
- Suggestions for improvement, if it will be repeated.

A 1995 report by the Joint Legislative Audit and Review Committee (JLARC) that evaluated Washington's system of approving inservice providers concluded that:

- "Minimal standards exist";
- "Washington [OSPI] screens the inservice provider, and once approved, all of their courses count as inservice credits. Other states appear to approve individual courses for approval or by the individual teachers submitting courses for approval";
- OSPI charged with investigating complaints. One complaint between 1987 and the 1995 JLARC report;
- OSPI audits providers "on a selective basis". In 1992 they conducted a statewide audit and "some providers had approval status revoked due to fact that they either did not keep the necessary records or they simply did not respond to the request for audit information"; and
- "Quality not evaluated" "few prohibitions on courses" "almost any course eligible"

A 2003 University of Washington report commissioned by the Center for Strengthening the Teaching Profession study found, "Put simply, the continuing education system treats virtually anything as suitable 'continuing education' for teachers, as the number of approved providers is vast and highly varied. Continuing graduate education, as well, can cover a multitude of educational experiences, some related directly to teaching but many not. In short, these investments in professional learning often have little to do with the purposes of the state's educational reform or specific learning needs of teachers".[13]

Washington collects and reports no data related to the quality, quantity, access to or satisfaction with professional development in math or other areas

PESB members agree that "word gets around" related to professional development opportunities that are good and those that are bad and that what their districts are providing is valuable and high-quality. However, from a state systems perspective, Washington State systematically does not collect and report statewide data related to the quality, quantity, access to or satisfaction with state-approved inservice professional development. No central source of information on providers, ratings, or recommendations by consumers exists. Related to math, there are no statewide data related to how much professional development in math is available, where it is available, or any indicators related to quality.

Research-Based Effective Inservice Professional Development

Although little has changed in terms of Washington State policy related to approval and evaluation of providers on inservice professional development, much has changed in terms of the state's understanding of and guidance provided related to the research on high-quality inservice professional development. This is beginning to shape dialogue and plans for a new system.

Education reform demands a radically different conceptualization of professional development for teachers. Professional Development is most successful when it is results-driven and job-embedded, focusing on goals for student learning that are based on assessment of the unique strengths and challenges of a particular school and its community. At its most useful level, professional development is no longer an event – a workshop or one-day training – but an ongoing process with a wide variety of activities, such as study groups, coaching, mentoring, action research, curriculum development and joint lesson planning. Its ability to have a lasting effect depends on the continuity between what is learned and what goes in the classroom. It is also far less focused on individual teacher interests and activities, and more on needs of entire staff and collaborative change and improvement.[14] As Washington School Research Center Director Dr. Jeffrey Fouts observes, this creates a significant challenge for education reform in that it requires teachers to make a significant shift from a culture of individualism to collaborative focus on school-wide improvement.[15] Another significant shift across the country, is that state policies and investments in professional development reflect the expectation that there be a demonstrated, direct link to improved student outcomes.

Teachers rank professional development that is in their subject area, directly related to their school, and extended over a period of time as most valuable, but also report that a relatively low percentage of professional development in which they've participated meet these criteria.[16]

While Washington lacks state data about the quality of professional development available to math teachers, we know from national data that there exists both good and not so good professional development. The big difference is the degree to which teachers see a direct connection between the professional development and the needs of their students. A recent national survey showed that teachers rank professional development related to their specific subject area, and professional development with follow-up over an extended period of time with direct linkages to current programs and activities at their school, as most valuable. The survey also showed that a relatively low percentage of the professional development activities in which these teachers participated met these criteria. Contrary to ill-informed anecdotes about questionable continuing education choices made by teachers, there is every indication that given the choice between high quality professional development and lesser quality, teachers want high-quality, relevant professional development.[16] The challenge is to make it available and provide the opportunity for participation.

In 2003, OSPI released the "Washington State Professional Development Planning Guide: Teacher Professional Development[17]". This Guide was developed "in response to the many requests from schools and districts for help in sifting through the research to isolate the most important concepts and processes that will assure that the valuable resources dedicated to professional development will result in increased student learning and teacher retention." The Guide aligns with National Staff Development Council (NSDC) standards for planning, delivery and evaluation of staff development[18], those of the National Board for Professional Teaching

Standards, as well as professional development standards being created in other states such as California, Indiana, Ohio and Delaware. Over the course of a year, more than 150 Washington teachers and representatives from over a dozen education organizations worked to design the guide. This developmental work was followed by a review of the research on effective professional development and identification of research based practices that are key to success in planning and implementing effective professional development.

The Washington State Professional Development Guide addresses, in general terms across content areas, both research-based design and content of effective professional development. In terms of content, research-based effective professional development must be a key part of the overall school improvement plan and process and also:

- Use Multiple Sources of Data – teachers must know their students learning needs well in order to design professional development that will help them better meet those needs;
- Deepen Content Knowledge and Pedagogy – deep knowledge of subject and how to teach it to a variety of learning styles is a skill that teachers must continue to refresh and refine;
- Promote Equity for all Students – by building teachers' cultural competency and ability to work with diverse student populations;
- Be Long-term and Adequately Resourced – effective professional development is ongoing and sustained;
- Build Collaboration and Develop Leadership Capacity – through collective inquiry and planning and opportunities for teachers to serve in leadership roles;
- Build Broad-Based Support – from communities, families and organizations; and
- Include Program Evaluation – in terms of impact on student learning and implications for future professional development.

In terms of the design of inservice professional development, it should be:

- Focused on Students – providing teachers the tools to assess and diagnose student needs and design powerful learning experiences;
- Tailored to the Needs of Each Educator – teachers at different stages of development or in different roles need different focus to their professional development;
- Supportive of Teacher Certification – professional development activities should be part of a larger professional growth plan, the completion of which leads to certificate renewal. Instead of accumulating clock hours, six districts in Washington State are piloting use of individual professional growth plans, approved by a building/district administrator as aligned with school/districts student learning goals, for certificate renewal.
- Supportive of School and District Improvement Efforts – a solid understanding of areas of needed change and improvement and this drives the focus of each teacher's professional development.
- Aligned with Washington's Essential Academic Learning Requirements – teachers need the knowledge and skills to help all students meet state standards.
- Aligned with federal requirements – federal requirements reinforce the need to ensure that professional development activities are research-based.

Essentially the same principles of effective professional development hold true for teachers providing mathematics instruction as for teachers in any other content area. But it may be true, given our state's education reform priorities and statewide efforts to improve math achievement,

According to a 2001 national survey, only 54% of elementary teachers feel fully prepared to teach to the mathematics standards for which they are now responsible. [20]

that demand for high-quality professional development opportunities related to math instruction is greater. A 2002 report from the Higher Education Coordinating Board reported that Washington has an increased need for professional development in mathematics.[19] National data reflect this need as well. According to a 2001 national survey, only 54% of elementary teachers feel fully prepared to teach to the mathematics standards for which they are now responsible.[20] But professional development related to effective mathematics instruction must focus not only on depth of content knowledge, but on instructional strategies for helping all students achieve. Recent University of Washington survey data commissioned by the Center for Strengthening the Teacher Profession shows that while 82% of Washington teachers have one or more students with an individualized education plan in their classroom, and more than two-thirds have one or more English language learners, only 34% report they feel "very prepared" to manage diverse learning needs in their classrooms.[21]

New Standards to Guide Provision of Professional Development for Continued Licensure

While Washington is providing new standards and guidance for districts in designing and planning research-based effective professional development, a misalignment currently exists between this guidance and the policy requirements and accountability for those approved providers that offer inservice professional development. Table 2 illustrates this misalignment.

Table 2

Inservice Education Approval Standards (WAC 180-85-200) ▪ Written objectives for each program ▪ Agenda with topics, date, time, names and qualifications of instructors ▪ Instructors have appropriate expertise ▪ Program materials available to all participants ▪ Compile evaluations; keep for 7 years ▪ Administrator of program analyze its success; reporting findings to governing body that oversees provider ▪ OSPI staff must be permitted to attend any inservice ▪ Provide forms for claiming clock hours **Inservice Education Program Evaluation Criteria (WAC 180-85-200)** ▪ Extent to which program matched written objectives ▪ Quality of physical facilities ▪ Quality of oral presentation ▪ Quality of materials provided ▪ Suggestions for improvement, if it will be repeated	**Professional Development Standards (design)** ▪ Focused on Students ▪ Tailored to the Needs of Each Educator ▪ Supports Teacher Certification ▪ Supports School and District Improvement Efforts ▪ Aligned with WA EALRS ▪ Aligned with federal requirements **Research Based Effective Practices in Professional Development (content)** ▪ Uses Multiple Sources of Data ▪ Deepens Content Knowledge or Pedagogy ▪ Promotes equity for all Students ▪ Is Long-term and Adequately Resourced ▪ Develops Leadership Capacity ▪ Builds Broad-Based Support ▪ Includes Program Evaluation

What are the implications for changes in the state role / system of approving providers of inservice professional development for certificate renewal?

The most important characteristic of a state system for approving providers is that it helps ensure teachers have adequate access to high-quality professional development opportunities that will improve outcomes for students. Guidance to districts in designing and implementing local professional development, like that provided in the Washington State Professional Development Guide, is an important part. In terms of approval of inservice professional development providers, states vary considerably in their approach, with differing implications for required state capacity and degree of quality control. Some rely heavily on state-controlled compliance / and regulation, while others delegate all decisions related to professional development to local school districts. For example, Ohio is generally considered to have gone farther than most states both in localizing the approval and provision of professional development, and in allowing autonomy in individual teacher development of professional growth plans. In 1996, Ohio's General Assembly mandated the establishment of Local Professional Development Committees in every school district. The purpose of each committee is to review and approve the professional development opportunities available that are aligned with the district's improvement plans. Teachers are required to formulate individual professional growth plans. The plan must meet both the identified areas professional growth needs and be aligned with the district's improvement plan. This approach puts decisions at local level / aligns with local needs and plans. However, it provides little statewide information as to the effectiveness of various providers of professional development opportunities. In contrast, Delaware's system is highly centralized at the state level. Providers apply to the Delaware Professional Standards Board and must demonstrate how their offerings meet the requirements of established professional development "clusters". Delaware still has clock hour certificate renewal, although it plans to pilot the use of professional growth plans. Appendix C contains the form required for Washington approved clock hours providers and examples of different types of state systems for approving providers.

The most important characteristics of a state system for approving providers is that it helps ensure teachers have access to high-quality professional development opportunities that will improve outcomes for students.

OSPI has developed a proposal for a market-based approach to state management and communication about professional development opportunities that meet the standards put forth in the Washington State Professional Development Guide. This system would include a centralized web-based format through which potential providers seeking state approval to award clock hours needed for continuing teacher certification register their offerings, specifying how each offering meets state standards. The aspect of OSPI's proposed system that differs from other states studied by the PESB is that it is a market-driven system that proposes to rely on teacher "consumer" ratings to determine evaluation and continued approval of providers, rather than state agency evaluation and audits.

Recommendations for State Policy Makers

As stated in our introduction, the PESB believes Washington is well underway in its efforts to increase student math achievement and is already experiencing positive results. Our recommendations focus on policy supports and programmatic changes related to increasing teacher knowledge and skills necessary for continued progress and improvement.

With these recommendations, the PESB supports the goals of:

- Ensuring that the knowledge and skill standards for prospective K-8, Middle-Level Math / Science (MLMS), and Secondary Math (Math) endorsed teachers are uniformly high and appropriate for them to help all students meet state standards.
- Promoting program approval processes and policies that highlight exemplary practice, emphasize accountability for results, and collect and report meaningful data for decision making.
- Providing teachers delivering instruction in mathematics, both new and experienced, with the support and resources they need to respond to higher standards and curriculum changes for students.
- Designing and implementing a new system by which the state sets standards and enhances access and opportunity for participation in high quality mathematics professional development equitably statewide.
- Moving away from a "clock hour" based system of certificate renewal to professional growth plans that allow math teachers greater flexibility to participate in a wider range of professional development activities that are directly tied to school and district learning improvement goals.

By statute, the PESB is an advisory body to the Governor, Legislature, Superintendent of Public Instruction, and State Board of Education (SBE) on issues related to educator preparation, certification, and professional growth, and has rulemaking authority for basic skills and subject knowledge testing for teacher certification. The SBE has statutory authority to adopt rules for all other aspects related to educator preparation and certification. The Office of Superintendent of Public Instruction (OSPI) is responsible for administering rules adopted by the SBE and PESB. The Higher Education Coordinating Board (HECB) has oversight and approval of degree granting programs at Washington's public higher education institutions. Although not specifically mentioned in all recommendations below, the Legislature, through RCW, holds authorizing authority for all activities described within these recommendations. The recommendations below reflect these roles and responsibilities.

PESB Report Finding 1:

Concern exists as to whether Washington's K-8, Middle-Level Math and Science (MLMS), and Secondary Math (Math) endorsement competencies reflect current research regarding the critical math content and content-specific instructional methodology that teachers providing math instruction should possess.

The PESB recommends:
The SBE request that the Professional Education and Certification (PEC) division of OSPI form a standards panel to review and revise the K-8, Middle-Level Math /Science (MLMS), and secondary Math endorsements and present their findings and recommendations for specific changes to the competencies to the Professional Educator Standards Board at its September 2005 meeting. The standards panel should include, at a minimum, representatives from mathematics content and methods faculty of higher education teacher preparation programs, practicing teachers holding these three endorsements, representatives from the Washington Association of Colleges of Teacher Education (WACTE), Washington Teachers of Teachers of Mathematics (WAToToM), Washington State Mathematics Council, and OSPI and/or ESD staff with K-12 math standards and curriculum expertise, a district administrator and a building principal. The panel will review relevant research and national mathematics standards, discuss differing beliefs and reach consensus related to type and depth of math knowledge and skills needed by elementary, middle-level and secondary math teachers. Questions for the review panel to address should include:

1. To what extent are the knowledge and skill standards contained in these three endorsement competencies appropriate and adequate to equip teachers in helping students to reach Washington's Essential Academic Learning Requirements and Grade-Level Expectations in mathematics?
2. How well do the endorsement competencies align with National Council of Teachers of Mathematics standards, math Essential Academic Learning Requirements, and K-10 Grade-Level Expectations for mathematics?
3. Given the already extensive list of competencies, is there adequate emphasis on the most essential competencies and are there those of lesser relevance that could be eliminated?

The PESB, as advisory body to the SBE, will review the standards panel findings and recommendations, invite feedback and testimony from stakeholders, and forward recommendations to the State Board of Education by November, 2005. As part of its deliberations, the PESB will specifically address options related to the K-8 endorsement, including increasing math content rigor and/or ceasing to offer a K-8 endorsement in favor of a K-6 and MLMS.

PESB Report Finding 2:
Similar concerns exist regarding the rigor and appropriateness of the subject knowledge tests required for a K-8, MLMS, or Math teaching certificate endorsement.

The PESB Recommends:
Following review and revisions to the K-8, MLMS, and Math endorsements by December 2005, the PESB will require that the proposed testing vendor demonstrate alignment of the subject knowledge tests for each of the three endorsements with the revised endorsement competencies in the request for proposal for the subject knowledge tests contract. The PESB will conduct this review, with guidance from our Technical Advisory Committee. The outcomes will play a large role in selecting the providers of these subject knowledge tests in Spring 2006.

PESB Report Finding 3:

Washington's movement toward a competency-based teacher preparation system, and varying conceptual differences about the type and depth of math content appropriate for prospective teachers, pose significant challenges within and across higher education institutions in their efforts to prepare teachers to reach uniform state standards. Preparing teachers involves the entire institution. Critics of teacher education sometimes fail to consider that prospective teachers gain most of their subject knowledge coursework through the college of liberal arts and sciences, not through the colleges of education.

The PESB Recommends:

The legislature charge the Professional Educator Standards Board with convening a cross-institutional task force to discuss program design and requirements related to prospective teachers achieving the revised K-8, MLMS, and math endorsement competencies. The task force should include the education deans or directors, or their designee, provosts or internal boards representing colleges of liberal arts, humanities and sciences from each of the higher education institutions with an approved teacher preparation program, representatives from community colleges with articulation agreements related to teacher preparation programs, and practicing teachers endorsed in these three areas. The Task Force discussion will include, but not be limited to:

1. Cross-institutional differences in course requirements, particularly for the Middle-Level Math / Science endorsement;
2. Institutional strategies whereby the revised competencies will drive curriculum; including identification of learner outcomes and needed changes in existing course requirements tied to the learner outcomes;
3. Institutional strategies to align math content and/or math instructional methodology offered by liberal arts faculty with math instructional methodology offered by the college of education faculty;
4. Strategies and incentives for recruiting prospective math teachers, with particular attention to increasing diversity in the prospective math teacher ranks, the potential need for targeted math degree enrollment increases, and increased capacity to prepare math teachers through alternative route programs; and
5. Strategies for articulating general education requirements for individuals entering teacher preparation programs seeking endorsements in K-8, MLMS, or Math to ensure they have adequate and appropriate math content.

The Task Force shall be charged with developing cross-institutional recommendations to submit to the legislature, State Board of Education, and Higher Education Coordinating Board by November 2006.

PESB Report Finding 4:

Teacher preparation program reviews and site visits require no expertise specific to each content area in which the programs offer endorsements.

The PESB Recommends:

The State Board of Education request that PEC work with the deans and directors of colleges of education to develop a formal process, and any needed policy change to support that process, for incorporating greater subject-specific expertise into the 5-year endorsement program review required by State Board WAC. The intent here is not to add significantly to the large volume of evidence already assembled by institutions as part of program review, but rather to bring additional expertise to the review of that documentation. Whenever possible, the process should be closely aligned with the academic program review process conducted every five years at public institutions, per Higher Education Coordinating Board requirements. The intent is also that in providing content-specific review prior to site visits, the site visit team will be better prepared with questions and insight from the content reviewers.

PESB Report Finding 5:

No single measure can be used to make inferences about program quality. What is needed is a coordinated and coherent system of meaningful data valuable to institutions and the state for highlighting exemplary practices and making program improvements. However, although teacher preparation programs are required to produce a significant amount of data related to various aspects of program quality, those data are not systematically compiled in a way that provide a comprehensive picture that can be easily accessed and reviewed by the public.

The PESB Recommends:

The PEC division of OSPI, with advice of the PESB teacher assessments program director, review current measures of preparation program quality and complete development of a framework and components of an improved state-level assessment system for educator preparation by Fall 2005. This system should include:

1. Plans for greater coordination and improved response rate on first-year teacher and principal surveys. Current return rates on these surveys are too low to be reliable or to disaggregate. Rather than sending graduates multiple surveys, institutions must explore consolidation of instruments and better coordination of dissemination and return. OSPI should work with institutions to identify more effective strategies for reaching program completers and in increasing response rates, such as working with first-year teacher mentors through the Teacher Assistance Program.
2. Evaluation of the usefulness of annual data requirements required from each institution's Professional Education Advisory Board, and plans for improvement, including the addition of specific questions and data requirements related to the preparation of teachers to provide math instruction.
3. Criteria and means for public reporting of innovative practices of approved teacher preparation programs, including examples of innovative preparation of teachers providing instruction in mathematics.
4. Information and data to be included in reports to be made public via the State Board and OSPI websites.

PESB Report Finding 6:

Washington continues to experience shortages of math teachers, particularly in rural and remote regions of the state. Current policy providing guidance and increased flexibility in assignment policy provides short-term relief to school districts as they struggle to fill open positions. In the long-term, however, the goal should be all math teachers holding the full, appropriate credential. Therefore, strategic recruitment, greater statewide access to preparation leading to certification, and opportunities for certified teachers to gain appropriate endorsements are needed.

The PESB Recommends:

The Legislature supports continued expansion of the Alternative Route Partnership Grant Program, with priority given to regions of the state without adequate access to alternative route preparation for prospective teachers in shortage areas, such as mathematics. In addition, the PESB commits to working with the SBE and colleges of education with the goal of statewide availability of the two new alternative pathways, developed by the PESB, through which teachers can earn additional subject endorsements without enrolling in a higher education program. The first Pathway recommended by the PESB, which requires passage of the Praxis II subject test for adding endorsements substantially similar to those currently held, is now available statewide. The second pathway, requiring classroom-based observation and passage of the Praxis II, will be available beginning March 2005. Once access to alternative pathways to subject endorsements is available statewide, the PESB will recommend to the State Board that it place greater restrictions and/or time limitations on out-of-endorsement assignment.

PESB Report Finding 7:

Progress to date and continued improvements in Washington's system of preparing and certifying math educators will help ensure that teachers providing instruction in math are highly qualified. Even so, it is unrealistic to expect that all new and experienced math teachers will possess all of the content and instructional skills they will need to deliver varying curriculum and to work in different school settings without additional guidance and support. Several national reports and research articles on improving math instruction suggest that developing a corps of math experts who can mentor, coach and identify needed professional development for other math teachers is a highly effective strategy. The PESB believes that this works best when assistance can come from within districts in the form of teacher colleagues with expertise who are available as-needed and possess a deep contextual understanding of that school's learning and improvement goals. However, many schools and districts struggling to find qualified math teachers lack the capacity to develop this model of support and assistance. For these reasons, no one model of assistance is appropriate for the variety of districts and schools in Washington State. In terms of ways for teachers to gain expertise to serve in a mentor or specialist role, other states have accomplished this through either state- or locally- provided training, or by gaining a formal credential through the state's certification system

The PESB Recommends:

Legislative funding support for math mentor teachers, as well as State Board pursuit of potential incorporation of a math specialist endorsement within the state certification system.

1. **Mentor math teachers:** The 2004 supplemental budget charged OSPI with developing "guidelines for eligibility, training, and professional development for mentor math

teachers". These guidelines are expected to be completed in June 2005. To the extent funds are available from the Legislature, districts would apply for funding for the 2005-06 school year to enable a teacher(s) to serve at least half-time assigned as a mentor math teacher, according to the state-provided guidelines. Priority could be given to districts and schools most in need, based on indicators of student math achievement, and those without current mathematics mentors, coaches or specialists. Eligible districts would submit plans approved by their local boards related to how they will meet state guidelines for selection, training and use of a mentor math teacher role beginning in school year 06-07. For larger districts this might mean they provide their own training. Smaller districts might send eligible teacher(s) to training provided by OSPI, ESDs, or other eligible providers. Small, rural and remote districts might subcontract their funds to ESDs that would pool funds to provide math mentors to work with multiple districts.

2. **Mathematics Specialist/Coach endorsement:** In addition to the first recommendation, the PEC division of OSPI report to the State Board of Education by Fall 2005 regarding the feasibility, potential benefits, and timeline for development and implementation of a mathematics specialist/coach certificate endorsement. Given the need for the holder of such a credential to have strong skills in mentoring other mathematics teachers, this credential might be less appropriate as an endorsement to a residency certificate, but an excellent option as the "core" of a teachers professional certificate program, or as an "add-on" endorsement to an existing certificate, via completion of an approved higher education endorsement program, or through one of the new alternative pathways to endorsements developed by the PESB. Also, because the new pathways for adding endorsements assess and acknowledge acquired knowledge and experience, teachers who have been serving as mentor math teachers or math coaches would have a means to demonstrate competency and earn this formal credential. The SBE should also consider whether this could be an endorsement to an administrator or ESA certificate as well.

PESB Report Finding 8:

Too often the answer to questions posed by the PESB regarding the qualifications of teachers providing instruction in mathematics and the availability of high-quality professional development has been "we don't know". Washington lacks critical data needed to inform policy development as well as evaluate effectiveness of implemented policies. For example, we don't currently know how many teachers providing instruction in mathematics hold a major or minor in math, whether they hold the appropriate certification for teaching math, whether there is a relationship between student demographics or geographic location and qualifications of math teachers, and whether or not and where math teachers have access to high quality professional development.

The PESB Recommends:

For the past year, the PESB has promoted the development of a coherent and comprehensive state data system that provides an accurate picture of the mathematics educator workforce and educator workforce as a whole to better inform decision making. We focused attention on it at an invitational policy forum last fall, and collaborated with the Center for Strengthening the Teaching Profession, University of Washington, and OSPI in identifying key data elements and discussing issues related to data management and use[22]. Development of a new online

certification system and central repository of educator credential data system is well underway within OSPI, and the PESB supports these efforts. Equally important, however, will be continued and increased collaboration with all relevant stakeholder groups and expertise in this area to ensure that new systems being developed are coordinated and comprehensive and will yield valuable information, not just increased data, that will be truly valuable for policy makers over the long-term.

PESB Report Finding 9:

Washington collects and reports no data related to the quality, quantity, access to or satisfaction with inservice professional development in math or other areas. Current standards for approving providers are minimal, and do not align with what is known from research, or promoted by the state in terms of guidance to districts, about the design and/or delivery of effective professional development for teachers providing instruction in math or other areas. (see table 2, page 19) No central source of information exists on professional development providers or opportunities, participant ratings or evaluation data.

The PESB Recommends:

The Legislature authorize development of a new state system for approving and evaluating providers of inservice continuing education and professional development for award of clock hours for maintaining teacher certification. This should include:

1. PESB and OSPI recommend to the SBE by May 2005 new standards for all state-approved providers. These standards must reflect known research-based effective practices in professional development and the Washington Professional Development Guidelines, and be aligned with and supportive of Washington's certification standards for teachers, and Essential Academic Learning Requirements (EALRs) in mathematics and other areas and Grade Level Expectations (GLEs) in mathematics and other areas for students. All providers will be expected to meet these new standards when registering offerings after June 2006.
2. The Legislature provide funding for the implementation of a web-based centralized professional development registry and evaluation system required for all state approved providers of professional development by June 2006. The PESB examined systems in many other states and supports a system such as this that is consumer and market-driven and evaluated, as opposed to costly, heavy state-regulatory models or locally-based approval which inefficiently requires each school district to seek out, review and approve providers. The purpose of this system would be to establish a standards-based system for professional development offerings, assist teachers in making informed decisions regarding professional development offerings, and allow state monitoring of teachers' evaluations of offerings.

   Components of this system would include:

   - Potential providers would be required to indicate how their specific offerings address state standards (including teacher certification standards, EALRs, GLEs, and school improvement goals) in their application.
   - State standards would serve as the parameters by which teachers can search for related approved professional development offerings available to them. A common web-

based evaluation form, aligned with the state standards would be required of participants in all offerings.

- Numerical ratings and evaluation comments from participants would be displayed on the web. Providers could opt not to have their evaluation ratings and comments displayed publicly, but ratings would still be state-monitored. Low-rated offerings would be audited and/or discontinued.
- The state and providers would be able to sort data to examine types of offerings sought and provided, attendance, and ratings to determine if needs in terms of type and focus of professional development are being met in various regions statewide. Thus the state would gain a clearer picture of the quality, quantity, and access to mathematics professional development for teachers statewide.

PESB Report Finding 10:

While the number and type of clock-hour bearing continuing education opportunities are varied, this approach tends to perpetuate the "event" model of professional development when in fact there are many other equally valuable teacher professional development activities that do not award clock hours. For example, a math teacher may be engaged in high-quality professional development that they and their school and/or district administrators agree is of value to the teacher and their students, such as a school-based mathematics action research project or serving on a mathematics curriculum development committee. Yet because these activities may not award clock-hours, they don't "count" toward requirements for certificate renewal and teachers find themselves in the position of discontinuing or cutting back on these valuable professional development activities in order to seek clock-hour bearing courses in order to maintain their certificate. In addition, currently, there is no requirement that teachers tie their choices of professional development for purposes of certificate renewal to school or district learning improvement goals. The PESB believes that the piloted use of approved professional growth plans that has taken place in six school districts in Washington provides individual teachers with greater flexibility in professional development opportunities that lead to certificate renewal and salary advancement, as well as requires explicit ties to school and district learning improvement goals.

The PESB Recommends:

We recommend that the two-year pilot of professional growth plans immediately move beyond the pilot stage to become an opportunity for all interested districts and teachers statewide. We recommend the SBE adopt rules allowing any interested school district, or approved private school in Washington State to submit a plan, approved by their local school board or private school governing body, to OSPI. The plan should describe how they will make available, as an option to individual teachers, the use of approved Professional Growth Plans for certificate renewal beginning in school year 05-06. The State Board WAC should reference the uniform eligibility criteria and application process for districts/private schools, including the signed support of the local education association, and the professional growth plan template for use by participating teachers, substantially similar to those in place for the pilots. State Board WAC should include annual review by local school board / private school governing body of the district's/school's professional development plan for staff, and a review of anonymous samples of individual professional growth plans as evidence of alignment between individual and district/school learning improvement goals.

Summary and Concluding Remarks

The Professional Educator Standards Board (PESB) was created to uphold the highest possible standards for certified educators in order to ensure the best possible education for Washington students. We've carefully considered the research and practices in other states and believe the recommendations contained in this report are important next steps in continuing to improve the knowledge and skills of Washington teachers providing instruction in mathematics, and thus the math achievement of students. Ultimately, however, this rests not just on the knowledge and skills of teachers providing mathematics instruction, but also on teachers providing the literacy skills so powerfully linked to math achievement, on the arts and physical education teachers that provide the cognitive development necessary for mathematics concepts to "stick", and in the integration of math throughout all areas of curriculum and instruction.

What teachers know and how they deliver instruction to students is by far the greatest determinate of what students learn and which students learn it in our schools. As such, we believe they are education's greatest resource. Therefore, we hope that state policymakers will carefully consider these recommendations, implementing policy changes and investing in the development of teacher knowledge and skills accordingly.

The PESB will report on response to and implementation of the recommendations contained in this report as part of our annual report for 2005 and subsequent years.

Summary of Recommendations

Recommendation	By When?	By Whom?	New $s?
1) Review and revise current endorsement competencies for K-8, Middle Level Math/Science and Math	10/05	OSPI Professional Education and Certification (PEC), Professional Educator Standards Board (PESB), and State Board of Education (SBE)	No.
2) Subject knowledge test vendor demonstrate alignment of the tests with the revised endorsement competencies	Spring '06	PESB	No.
3) Convene a cross-institutional task force to discuss program design and requirements related to achieving the revised competencies.	11/06	Legislature and PESB	Yes. Short-term contract for staffing assistance
4) Incorporate individuals with expertise in the content areas into the 5-year endorsement program review process.	Fall 2005	SBE and PEC	No. Funded through certification fees
5) Review current measures of preparation program quality and complete development of a framework and components of a state level assessment system for educator preparation.	Fall 2005	PEC and PESB	No.
6) Continued expansion of the Alternative Route Partnership Grant Program with priority given to regions of the state without adequate access to alternative route programs.	05-07 biennium	Legislature and PESB	Yes. PESB 05-07 request = $1.46 m
7) a) Funding mentor mathematics teachers	a) Districts apply 05-06; math mentors trained and operating 06-07.	a) Legislature, OSPI, ESDs and others	a) Yes, scaleable
b) Pursue potential addition of mathematics specialist /coach endorsement within certification system	b) Fall 2005 report on feasibility and anticipated demand	b) SBE and PEC	b) No.

Recommendation	By When?	By Whom?	New $s?
8) Development and implementation of electronic/online certification system and central repository of educator credential data.	Summer 2005	OSPI	No.
9) Development and implementation of a new state system for approval and evaluation of state-approved providers of inservice continuing education. a. PESB and OSPI recommend the adoption of new standards to the SBE b. Legislature provide funding to implement a web-based centralized professional development registry and evaluation system for state approved professional development providers	a) 5/05 b) 6/06	a) OSPI and PESB b) Legislature, OSPI and PESB	a) No. b) Yes. OSPI 05-07 request = $500,000
10) SBE to adopt rules allowing interested school districts to implement the use of Professional Growth Plans to renew/maintain certificates.	05-06 school year	Legislature, SBE and PEC	No.

Appendix A

List of Certificate Endorsements

Washington Endorsements

Bilingual Education

Designated Arts:
- Dance
- Drama
- Music: Choral
- Music: General
- Music: Instrumental
- Visual Arts

Designated Science:
- Biology
- Chemistry
- Earth Science
- Physics

Designated Career & Technical Ed:
- Agricultural Education
- Business Education
- Family & Consumer Science Education
- Marketing Education
- Technology Education

Designated World Language:
- Chinese
- French
- German
- Italian
- Japanese
- Latin
- Norwegian
- Puget Sound Salish
- Russian
- Spanish
- Swedish

Early Childhood Education
Early Childhood Special Ed
Elementary Education
English
English/Language Arts
English as a Second Language
Health/Fitness
History
Library Media
Mathematics
Middle Level
Reading
Science
Social Studies
Special Education
Traffic Safety

Appendix B

Chart Showing Differing Course Requirements for K-8, Middle Level Math / Science and Math Endorsements

Math Preparation Requirements			
Institution	**Elementary**	**Middle Level Math/Science**	**Secondary Math**
Antioch University	Math Content for K-8 Teachers I Math Content for K-8 Teachers II Math Methods for K-8 Teachers	Math Content for K-8 Teachers I Math Content for K-8 Teachers II Math Methods for K-8 Teachers	**30 credits in Math covering number theory, measurement, euclidean geometry, calculus, probability/statistics, algebra-elementary, linear, abstract-discrete math, history of math** Math/Science I Math/Science II Math/Science II
Central Washington University	EDEL 323 Teaching Elementary School Math Math 164.1 Foundations of Arithmetic I	**(Must be paired with an endorsement major in elementary ed, biology, chemistry, earth science, math or physics)** Math 130.1 Finite Math I Math 164.1 Foundations of Arithmetic I Math 250 Intuitive Geometry for Elementary Teachers EDEL 468 Problem Solving Techniques for Middle Level SCED 323/Math 323 Teaching Experience in Math & Science	**Major (61 quarter credits)** Math 172.1, 172.2, 272.1 Calculus Math 260 Sets and Logic Math 265 Linear Algebra I Math 299E Orientation Seminar: Secondary Math Math 311 Statistical Concepts and Methods Math 320 History of Mathematics Math 324 Methods of Materials in Math-Secondary Math 332 Discrete Models Math 355 College Geometry I Math 360, Algebraic Structure I Math 361 Algebraic Structure II Math 430 Introduction to the Theory of Numbers Math 455 College Geometry II Math 499E Senior Seminar: Secondary Math **Minor (46 credits) Meets endorsement requirements.**
City University	EDE 406 Math Concepts and Methods (BA Program) ETC 541 Math Concepts and Methods (MIT Program)	EML 310 Advanced Topics in Middle School Mathematics Instruction EML 330 Integrating Middle School Math and Science Instruction	Currently under development

Math Preparation Requirements			
Institution	**Elementary**	**Middle Level Math/Science**	**Secondary Math**
Eastern Washington University	Math 211 Structure of Elementary Math I Math 212 Structure of Elementary Math II	NA	**(73 quarter credits)** Math 161 Calculus I Math 162 Calculus II Math 163 Calculus III Math 225 Foundations of Math Math 231 Linear Algebra Math 241Calculus IV Math 261 Continuous Functions Math 320 History of Math Math 370 Surveys of Geometries Math 385 Probability and Intro to Stats Math 386 Applied Statistics Math 431 Intro to Modern Algebra I Math 432 Intro to Modern Algebra II Math 492 Problem Solving Seminar Math 493 Methods of Teaching Math 494 Senior Seminar CSED 392 Computer Technology in Secondary School **39 credit minor also available**
Gonzaga University	Math 121 Introductory Stats Math 203 Math for Elementary Teachers EDTE 303 Math Methods	NA	**(31 semester credits)** Math 157 Calculus & Analytical Geometry I Math 231 Discrete Structures Math 258 Calculus & Analytical Geometry II Math 259 Calculus & Analytical Geometry III Math 321 Statistics for Experimentalists Math 339 Linear Algebra Math 341 Modern Geometry Math 437 Abstract Algebra I EDTE 454 M Secondary Math Methods

Math Preparation Requirements			
Institution	**Elementary**	**Middle Level Math/Science**	**Secondary Math**
Heritage College	Math 101 Algebra and Applications ED 332 Methods in Science and Math Math 350 Math for Elementary Teachers	NA	**(33 semester credits)** Math 210 Calculus & Analytical Geometry I Math 211 Calculus & Analytical Geometry II Math 221 Intro to Probability & Statistics Math 312 Calculus & Analytical Geometry III Math 330 Differential Equations Math 331 Linear Algebra Math 410 Intro to Abstract Math 3 upper division electives
Northwest College	Math 1523 Math for Elementary Ed I Math 1533 Math for Elementary Ed II EDUC 4132 Math Methods	NA	Math 1243 Calculus I Math 2245 Calculus II Math 2302 History & Structure of Math Math 2402 Discrete Math Math 3003 Probability & Statistics Math 3213 College Geometry Math 3245 Calculus III Math 3322 Linear Algebra Math 3433 Number Theory Math 3513 Ordinary Differential Equations Math 4213 Intro to Modern Algebra Math 4441 Math Assistantship I Math 4451 Math Assistantship II Math 4712 Secondary Math Methods Math 4752 Math Specialist Methods

Math Preparation Requirements			
Institution	**Elementary**	**Middle Level Math/Science**	**Secondary Math**
Pacific Lutheran University	EDUC 406 Math in K-8 Math 123 or equivalency	Math 151 Intro to Calculus Math 152 Calculus II Math 203 History of Math Math 317 Intro to Proof in Math Math 321 Geometry Math 341 Intro to Math Stats	Math 151 Intro to Calculus Math 152 Calculus II Math 203 History of Math Math 317 Intro to Proof in Math Math 321 Geometry Math 331 Linear Algebra Math 341 Intro to Math Stats Math 433 Abstract Algebra Math 351 Differential Equations **OR** Math 356 Numerical Analysis **OR** Physics 153 General Physics
Saint Martin's College	Math 101 (Intermediate Algebra) or higher ED 411 Elementary Math: Content and Methods	MATH Elective (9) ED411 Elementary Math: Content and Methods (4) **OR** ED484 Secondary Methods (3) **AND** ED487 Secondary Methods Practicum	**(39 semester credits)** MTH101 Intermediate Algebra MTH121 Precalculus MTH171 Calculus I MTH172 Calculus II MTH366 Euclidean/Non Euclidean Geometry MTH357 Probability and Statistics MTH353 Linear Algebra **OR** MTH361 Intro to Abstract Algebra MTH220 Discrete Math MTH314 History of Math ED411 Math Methods ED484 Secondary Methods ED487 Secondary Methods Practicum

Math Preparation Requirements			
Institution	**Elementary**	**Middle Level Math/Science**	**Secondary Math**
Seattle Pacific University	Math 2530 Survey of Math for Elementary School Teachers I Math 2531 Survey of Math for Elementary School Teachers II EDMA 3000 Math Methods I EDMA 4000 Math Methods II	NA	**(60 Credits)** Mat 1225, 1226 Calculus Mat 1228 Series and Differential Equations Mat 2228 Multivariable Calculus Mat 2375 Probability Theory Mat 2376 Applied Statistics Mat 2401 Linear Algebra Mat 2720 Discrete Math Mat 3749 Intro to Analysis Mat 3441 Axiomatic Geometry **OR** Mat 3443 Transformational Geometry Mat 4402 Modern Algebra I Mat 4610 Evolution of Mathematical Mat 3751 Real Analysis II **OR** Mat 4403 Modern Algebra II Mat 4899 Senior Seminar Electives (8 credits) EDMA 3357 Teaching Secondary Mathematics
Seattle University	Math 200 **OR** EDUC 412	NA	Transcript Analysis-course in Algebra, geometry, trigonometry, statistics/probability, calculus Praxis II
The Evergreen State College	8 credits to include algebra, geometry, and statistics	12 credits to include at least 4 credits of calculus, and course work in geometry, algebra, and statistics	PRAXIS II **(45 quarter credit)** Geometry Probability & Statistics Calculus (integral and differential)-12 Discrete Math-4 Logic and Problem Solving-4 History or Foundations of Math-4 Modern Abstract Math-4

Math Preparation Requirements			
Institution	**Elementary**	**Middle Level Math/Science**	**Secondary Math**
University of Puget Sound	Math 616 (Math Methods Module) PRAXIS II	Math 616 (Math Methods Module) PRAXIS II	Math 618D (Math Methods Module) PRAXIS II
University of Washington-Bothell	Two math courses 100 level and above that demonstrate competencies in at least two of the following areas: probability and statistics, number theory, algebra and geometry. BEDUC Knowing, Teaching and Assessing in Mathematics	NA	NA
University of Washington-Seattle	Math 170 Math for Elementary School Teachers EDTEP 521 Teaching and Learning in Numeracy I EDTEP 522 Teaching and Learning in Numeracy II	NA	Math 124 Calculus w/Analytical Geometry I Math 125 Calculus w/Analytical Geometry II Math 126 Calculus w/Analytical Geometry III Math 307 Intro to Differential Equations Math 308 Matric Algebra w/Applications Math 394 Probability Math 411 Intro to Modern Algebra for Teachers I Math 412 Intro to Modern Algebra for Teachers II Math 444 Geometry for Teachers Math 487 Advanced Math Computer Lab Math 354 Math Enrichment for Schools I Math 355 Math Enrichment for Schools II **OR** Phys 407 Physics by Inquiry I Phys 408 Physics by Inquiry II Phys 409 Physics by Inquiry III Stat 390 Probability and Statistics in Engineering and Science **OR** Stat 311 Elements of Stat Methods **OR** QSCI 381 Intro to Probability and Stats

Math Preparation Requirements			
Institution	**Elementary**	**Middle Level Math/Science**	**Secondary Math**
University of Washington-Tacoma	TEDUC 460 Math Methods I TEDUC 461 Math Methods II PRAXIS II	5 credits that cover number sense, measurement, and algebraic sense TEDUC 460 Math Methods I TEDUC 461 Math Methods II PRAXIS II	
Walla Walla College	Math 112 Math for Elementary Teachers Math 113 Math for Elementary Teachers EDUC 373 Elementary Curriculum and Instruction:Mathematics	NA	**(57 quarter credits)** Math181 Analytical Geometry and Calculus I Math250 Discrete Mathematics Math281 Analytical Geometry and Calculus II Math282 Analytical Geometry and Calculus III Math283 Analytical Geometry and Calculus IV Math289 Linear Algebra with Applications Math312 Ordinary Differential Equations Math315 Probability and Statistics Math321 Geometry Math451 Advanced Calculus Math452 Advanced Calculus Math461 Abstract Algebra Math496 Seminar MEDU395 Methods of Teaching Math Math Electives (8)

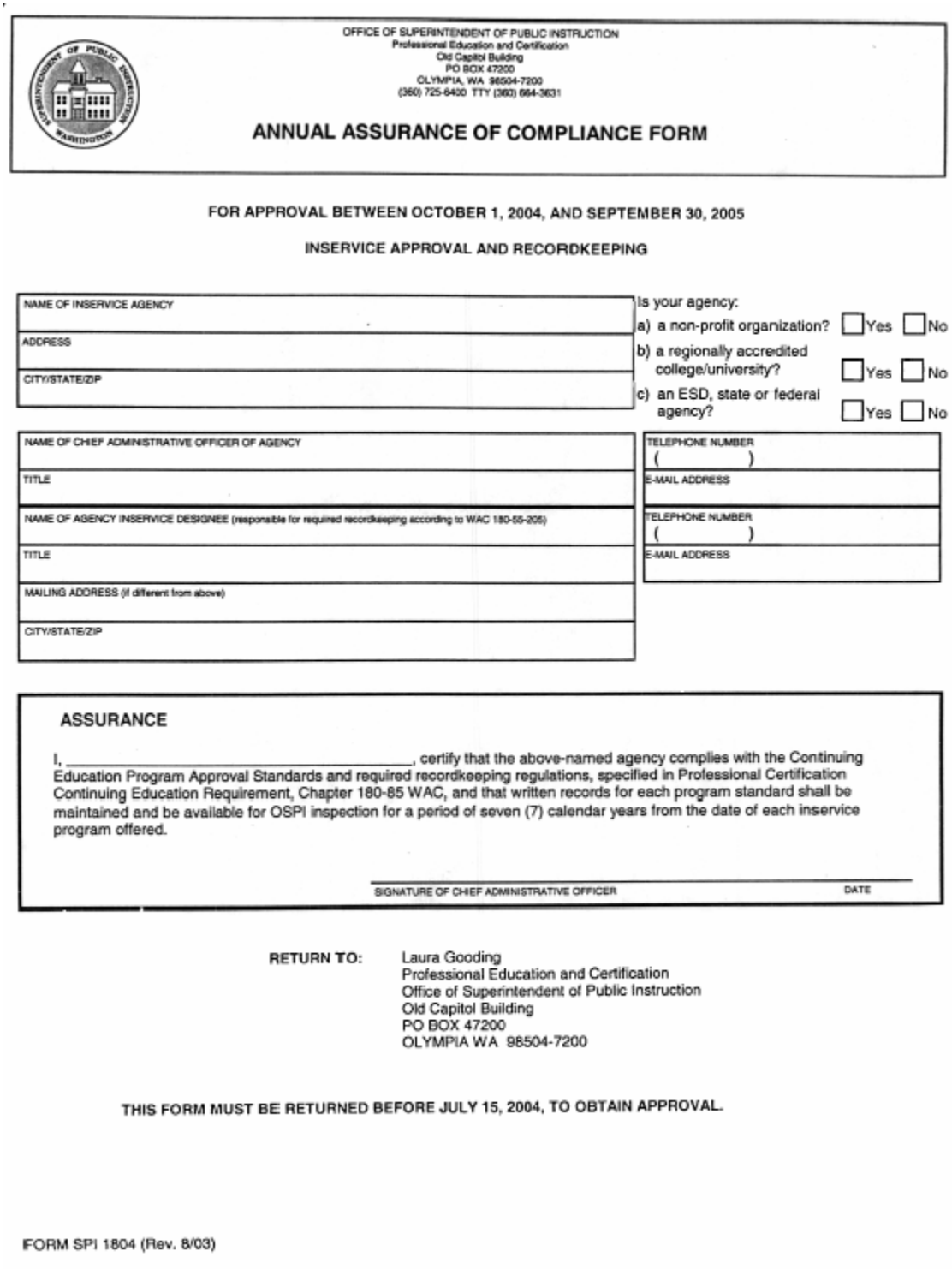
Math Preparation Requirements			
Institution	**Elementary**	**Middle Level Math/Science**	**Secondary Math**
Washington State University	Math 251 Math for Elementary Education I Math 252 Math for Elementary Education Teachers II	NA	**(37 semester credits)** Math 171 Calculus I Math 172 Calculus II Math 220 Intro Linear Algebra Math 273 Calculus III Math 303 Higher Geometry Math 315 Differential Equations Math 330 Methods of Teaching Secondary School Math Math 360 Probability and Statistics Math 398 Mathematical Snapshots CPTS 153 Basic Programming Phys 201 Physics for Scientists Math 320 Elementary Modern Algebra **OR** Math 421 Algebraic Structures Elective
Western Washington University	Math 381 Teaching K-8 Math I Math 382 Teaching K-8 Math II Beginning in academic year 2005-2006, add Math 383 -Teaching K-8 Mathematics III. This curriculum revision modifies the current two-course series (8 quarter credits) to a three-course series (11 quarter credits), providing opportunities for greater depth in math concepts.	NA	**(70 quarter credits)** Math 124/125 Calculus & Analytic Geometry Math 204 Elementary Linear Algebra Math 209 Discrete Mathematics Math 224 Multivariate Calculus & Geometry Math 226 Limits & Infinite Series Math 302 Intro to Proofs via Number Theory Math 331 Ordinary Differential Equations Math 341 Probability & Statistics Math 360 Euclidean and Non-Euclidean Geometry Math 419 Historical Perspectives of Math Math 483 Methods of Teaching Secondary Math Math 207 Math Computing -plus four courses from a list of six courses Minor (41 quarter credits) plus an elective adds a math endorsement Combined Math/Chemistry and Math/Physics majors also meet endorsement requirements (45-46 credits)

Math Preparation Requirements			
Institution	**Elementary**	**Middle Level Math/Science**	**Secondary Math**
Whitman College		NA	
Whitworth College	MA 221 Math for Elementary Teachers MA 341 Math: Elementary Methods	NA	**(41 semester credits)** *MA 110 Calculus I *MA 111 Calculus II *MA 210 Calculus III *MA 256 Elementary Probability & Statistics *MA 316 Discrete Mathematics *MA 330 Linear Algebra *MA 365 Modern Geometry CS 171 Computer Science I CS 172 Computer Science II **Four upper-division math courses from the following:** MA 317 Intro to Complex Variables MA 340 Advanced Calculus I MA 341 Advanced Calculus II MA 350 Numerical Analysis MA 360 Number Theory MA 410 Algebraic Structures MA 430W Graph Theory and Combinations MA 456 Math Stats I MA 457 Math Stats II MA 481 Topics Seminar **EDU 454 Math in Secondary School *Minor-meets endorsement requirements **Required for certification

Appendix C

Required Application Form for Washington Approved Providers of Clock Hour Offerings for Certificate Renewal and Examples of Different Types of State Systems for Approving Providers

Required Application Form for Washington Approved Providers of Clock Hour Offerings for Certificate Renewal



OFFICE OF SUPERINTENDENT OF PUBLIC INSTRUCTION
Professional Education and Certification
Old Capitol Building
PO BOX 47200
OLYMPIA, WA 98504-7200
(360) 725-6400 TTY (360) 664-3631

ANNUAL ASSURANCE OF COMPLIANCE FORM

FOR APPROVAL BETWEEN OCTOBER 1, 2004, AND SEPTEMBER 30, 2005

INSERVICE APPROVAL AND RECORDKEEPING

NAME OF INSERVICE AGENCY	
ADDRESS	
CITY/STATE/ZIP	

Is your agency:
a) a non-profit organization? ☐ Yes ☐ No
b) a regionally accredited college/university? ☐ Yes ☐ No
c) an ESD, state or federal agency? ☐ Yes ☐ No

NAME OF CHIEF ADMINISTRATIVE OFFICER OF AGENCY	TELEPHONE NUMBER ( )
TITLE	E-MAIL ADDRESS
NAME OF AGENCY INSERVICE DESIGNEE (responsible for required recordkeeping according to WAC 180-85-205)	TELEPHONE NUMBER ( )
TITLE	E-MAIL ADDRESS
MAILING ADDRESS (if different from above)	
CITY/STATE/ZIP	

ASSURANCE

I, _____, certify that the above-named agency complies with the Continuing Education Program Approval Standards and required recordkeeping regulations, specified in Professional Certification Continuing Education Requirement, Chapter 180-85 WAC, and that written records for each program standard shall be maintained and be available for OSPI inspection for a period of seven (7) calendar years from the date of each inservice program offered.

_____
SIGNATURE OF CHIEF ADMINISTRATIVE OFFICER DATE

RETURN TO: Laura Gooding
Professional Education and Certification
Office of Superintendent of Public Instruction
Old Capitol Building
PO BOX 47200
OLYMPIA WA 98504-7200

THIS FORM MUST BE RETURNED BEFORE JULY 15, 2004, TO OBTAIN APPROVAL.

FORM SPI 1804 (Rev. 8/03)

Examples of Different Types of State Systems for Approving Providers

Pennsylvania

As of 1999, approved professional development providers must:

- Conduct ongoing needs assessments of professional development
- Evaluate professional development offerings
- Electronically submit professional education participation records and evaluation data
- Ensure that all offerings adhere to state-established criteria and expectations, including documenting how each professional education experience:
  - Is related to attainment of Pennsylvania academic standards
  - Is planned in response to a need of a school
  - Has clear and concise, written content and skill-based competencies
  - Includes content and instructional methods appropriate for the intended competencies
  - Is planned and conducted by personnel who have an appropriate degree or experience in subject of the professional education experience
  - Is research-based, data-driven and contributes to measurable increases in student achievement
  - Provides sufficient support and resources over time
  - Contributes to building leaning communities of continuous improvement
  - Requires that participants demonstrate attainment of the competencies
  - Is evaluated by the participants.

http://www.teaching.state.pa.us/teaching/lib/teaching/Approved_Provider_Guidelines2004.pdf

Delaware

Professional Development "clusters" of varying rigor and duration count for certificate renewal and are directly related to percentage salary increments. Applicants to become state-approved "cluster" providers must demonstrate how each offering will lead to measurable and observable knowledge and skills; how they have the potential to positively impact student learning; and how they are ground in the Delaware standards. The Delaware Professional Standards Board evaluates each cluster proposal, rating the degree to which the cluster:

- Supports educators in meeting the standard it intends to address;
- Incorporates principles of adult learning and research-based effective professional development;
- Supports sustained improvement in quality of instruction;
- Will impact student learning;
- Clearly articulates the activities and learner outcomes expected;
- Has a well-articulated evaluation plan.

http://www.doe.state.de.us/ProfStandardsBoard/AppforProfDevClusters/ltrtoproviders1.pdf

New Jersey

The New Jersey Professional Teaching Standards Board maintains a web-based listing of professional development providers and opportunities. This database may be searched by geographic area served, core curriculum content standard each offering addressed, instructional concentration, and keywords. The state plays no role in approving, endorsing, or sponsoring any of these offerings, however, and the site contains a disclaimer to this effect.
http://www.nj.gov/njded/profdev/providers/search.htm

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